

**STEERING COMMITTEE MEETING SUMMARY  
ETV PACKAGE DRINKING WATER TREATMENT SYSTEMS PILOT  
AUGUST 24, 1999**

A Steering Committee Meeting was held at the NSF International Headquarters in Ann Arbor, Michigan, on August 24, 1999. The meeting commenced at 8:45 am. Tom Bruursema of NSF welcomed the group. Bruce Bartley, NSF ETV Project Manager, reviewed the Antitrust Statement printed in the meeting packet and lead the introduction of meeting attendees (a list of attendees and their affiliations is presented at the end of this meeting summary). Bruce also formally thanked the state representatives on the Steering Committee who are resigning from the Committee and presented each with a certificate of appreciation. These included John Sadzewicz, Allen Hammer, Rene Pelletier, and Jerry Biberstine, ETV Steering Committee Chairman. Bruce also introduced two new Steering Committee members from state drinking water administrations: Victor Wilford from West Virginia and Kevin Brown from Utah.

Jerry Biberstine started the meeting by asking the attendees if there were any areas on which they thought the meeting should focus. John Dyson stated that costs for ETV testing would be a good topic. No other specific suggestions were given.

**Protocols**

Carol Becker, NSF environmental engineer, discussed the status of the protocol development. The Protocols have been updated based on the Steering Committee's recommendations at the January 1999 meeting. The 5 final protocols include those for Microbiological Reduction, Microbiological Inactivation, Removal of DBP/Ps, Removal of Arsenic and Removal of Inorganic Constituents. Protocols for Removal of VOCs, SOCs and Nitrate are being voted upon by the Steering Committee, and the Protocol for Removal of Radionuclides will be sent to the Steering Committee for review and recommendation in September. Test Plans are in various stages of development. An overview of the protocol development status can be reviewed on NSF's ETV web site ([www.nsf.org/etv](http://www.nsf.org/etv)). Copies of protocols can be downloaded from the internet or requested in hard copy from Carol Becker or Kristie Wilhelm.

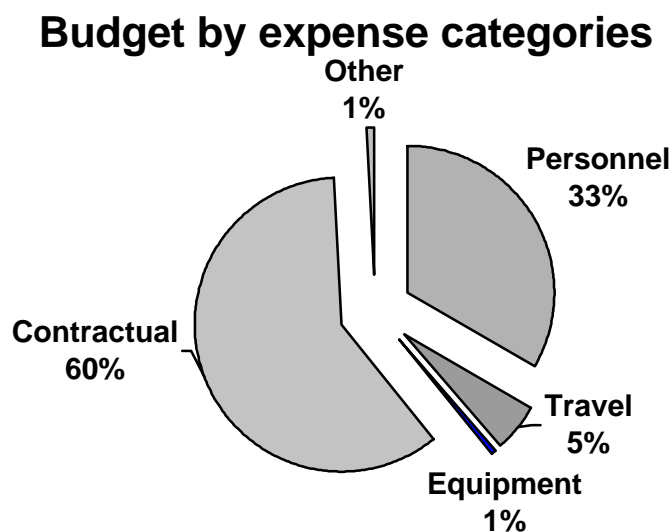
**Testing Status**

Kristie Wilhelm, NSF environmental engineer, discussed the status of testing in the Package Drinking Water Treatment Systems (PDWTS) ETV Pilot. 18 ETV applications have been approved for testing by NSF and the EPA. The first ETV test was conducted on the Calgon Carbon Sentinel UV Reactor and the reports were issued in May 1999 for this test. There are currently four ETV tests which are complete and in the report preparation phase. Six products are currently undergoing ETV testing. Seven other applications have been approved and are either in start-up testing phase or have not yet begun. Testing status can also be found on the NSF web site.

**Budget and Future Activities**

Bruce Bartley presented information on the pilot project's budget status and projected future

activities of the project. NSF projects expending 91% of the total budget leaving 9% for any unforeseen expenses before the pilot period expires on September 30, 2000. Subcontracts for matching funds and protocols comprise the largest share of the pilot's budget. The following chart illustrates budget expenses by category:



The estimated average testing cost was \$47,000 for one product during one test period, including reporting expenses but excluding optional tasks. The average estimated cost of testing was derived from the total of the estimates of all testing components: leveraged funding (in-kind services and actual water utility funding), expenses to be paid by the vendor and the ETV PDWTS pilot contribution. The cost of optional testing such as microbiological seeding or spiking studies was subtracted from the total of the testing components. The resulting adjusted cost was then divided by the number of seasons to derive the final weighted, estimated cost for one season.

David Pearson asked if the \$47,000 figure included out of pocket expenses from the manufacturer. Bruce clarified that funding provided by the manufacturer was counted in the \$47K but the in-kind contributions such as labor and equipment were not.

John Dyson noted that if you have a unique product, it would seemingly cost more to test your product by itself at a single site. Glen Latimer agreed. He said that Kinetico is testing two products by themselves and their total cost is more than \$47,000. John Dyson wondered what the testing cost per product was for products that were tested concurrently with other equipment. Bruce responded that Greg McKelvey would touch on this topic during his discussion. John stated that some technologies are inherently less expensive to test than others and that he thinks \$90,000 is a more realistic number, not including in-kind contributions of the Manufacturer.

Jerry Biberstine noted that the manufacturers will not do the testing if they do not think it is worthwhile in their marketing strategy. He speculated that many membrane manufacturers are

participating because the state regulators currently have an emphasis on membrane technologies.

Bruce noted that after the current tests have concluded and more data is available on actual costs of testing, fixed costs of testing, reporting, FOD preparation, etc, will be tallied and analyzed. He believes that an economy of scale will likely be seen on reporting and on labor where there is testing of multiple products on one site. John Dyson agreed with that statement in the case where the products and their claims are similar but added that multiple vendor testing may not be possible for a newer, more innovative or unique product.

Peter Shanaghan stated that he understands the concerns of the Manufacturers, but from the EPA perspective, the issue is the value of participating in the program. Testing done well should have benefits in entry to the states and although it may be too early to tell, we should focus on maximizing the benefits of participating. John Dyson responded that the big question is how much benefit there is to participating. He believes it may be three years before real feedback is received on these tests and that is a large question mark. Glen Latimer added that if the ETV program brings state administrators and their requirements together to agree on testing requirements, that would be worth a fortune to manufacturers. Based on what he is hearing now, the benefit will likely be limited piloting. Some state representatives are only vaguely familiar with the program. States need to be brought on-board more effectively to this pilot. Bruce responded that if our Steering Committee/stakeholder meetings continue to be held in Ann Arbor, state representatives can continue to be reimbursed for travel expenses, and that has enhanced state representatives' attendance. He stated that Rick Sakaji will be presenting on the ETV project at the ASDWA conference in October and that verification reports and statements are sent to the approximately 140 state administrators on the project's mailing list.

David Pearson thought that the original protocols and test plans focused on technologies for larger systems and that for very small systems, there are two main challenges: 1) return on investment for the manufacturer and 2) how large is the market for the systems once they are tested (which is a very difficult thing to determine).

Bruce continued his discussion on the future of the PDWTS ETV project. Supplemental funding for protocol validation studies was received from the EPA. The challenge is to launch the effort and complete it before the end of the pilot (September 30, 2000). The unfinished test plans will be completed and NSF will begin the process of maintaining protocols and test plans. The protocol validation studies will assist NSF with this future effort.

The present testing involving matching funds must be completed with reports done before September 30, 2000. NSF will manage the verifications to assure there is little or no slippage in the schedule. Any significant delays in other protocol development or testing could mean the inability to pay subcontractors from the EPA pilot period funds.

NSF expects other verification tests involving private funds to begin and proceed past the pilot period.

The final pilot report, which is written by NSF for the EPA, is due before the pilot ends on September 30, 2000, and will consume a considerable amount of time from the NSF staff.

The EPA has a policy to award agreements for a permanent ETV PDWTS program under a competitive bid scenario. NSF intends to submit its proposal to the EPA to continue to administer the PDWTS as the verification organization.

### **ETV Overview**

Penny Hansen gave an overview of the ETV Program. The program, established in 1995, was designed to be a five-year exercise. The exercise was intended to determine whether an ETV in different fields provides a benefit to the marketplace (is there a need for objective data on a common base), and whether the taxpayer and industry can afford such testing. In general, things have gone slower than hoped.

There are ETV pilot programs in 12 areas: six water, six pollution prevention. To date, the 12 pilots have yielded:

- 61 Test Plans/Protocols
- 39 Technologies verified
- 109 technologies in testing/evaluation process
- 202 applications pending

Participation has been great across the US: vendors from 35 states are participating so far.

### **Hot and Cold Markets**

- Exporters love ETV – they will participate and pay for testing
- Monitoring technologies (air, water, in-line) are hot for ETV
- There is an early positive response for air pollution and greenhouse gas technologies
- Drinking water community is cautious but coming around
  - Each time we do testing, it gets cheaper and more efficient
  - Economy of scale technologies show a disparity in cost range from innovative technologies
- Generally there has been a low response for pollution prevention technologies – they do not lend themselves well to verification testing

### **Lessons Learned**

- Stakeholder process is the core of the program. They are the major contributors, shapers of priorities, processes, protocols and outreach activities
- Protocols for verification testing largely do not already exist (i.e. ASTM). ETV protocols are a major scientific contribution to technology commercialization and are very valuable to the stakeholders and market.
- There is a burgeoning international interest in ETV. A large number of products in testing are foreign. Of the 15,000 visits per month to the EPA ETV web site (visit being defined as viewing at least two sites within the EPA ETV site), approximately 15% are from abroad.

Approximately three weeks ago, the EPA signed a Memorandum of Agreement (MOA) with the Department of Defense (DOD) to mutually verify technologies that are of interest from the defense and environmental viewpoints. They are still determining how to work together, but the DOD has more money to verify technologies that are directly related to and of benefit to defense. These may include water technologies, as potable water is needed on bases and in the field.

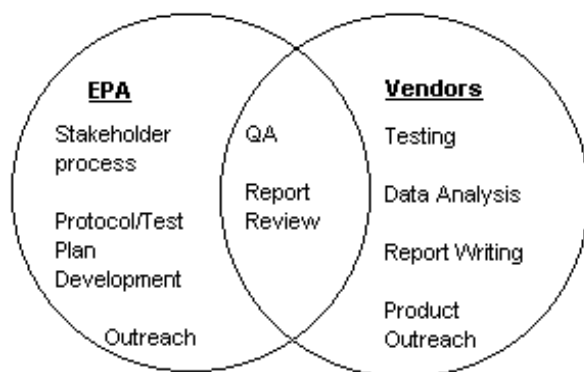
### Future of ETV

Penny stated that the ETV Programs will make its Government Performance and Results Act (GRPA) goals (50 verifications by the end of fiscal year '99 and 150 by the end of fiscal year 2000). The pilot period ends October 1, 2000, and the report to Congress is due October 1, 2001. This report will include how much testing cost, how long the tests were conducted, were they of value to the vendors, and recommendations. The report will focus on cost and vendor response and a survey of the stakeholders will be conducted to gather such information. Recommendations to Congress could include closing the ETV Program altogether, continuing the Program, or continuing only certain ETV projects where the testing is of greatest benefit.

If the ETV Projects are continued, the cooperative agreements with the verification entities will be recompeted for the period 2001-2003. The budget projections are as follows for the entire ETV Program:

2000 - \$7.2 million  
 2001 - \$6.0 million  
 2002 - \$5.0 million  
 2003 - \$4.0 million

These figures are intended to cover activities that the EPA will continue to support after the pilot period. The ongoing program is anticipated to continue at \$3-4 million per year to support EPA functions of the program. ETV financial support of the different projects is anticipated to



continue following these guidelines:

### Verification Program Quality Criteria

- Fairness – testing available to all vendors of commercially ready products
- Credibility – objective third party testers; pre-existing protocols/test plans that are publicly available

- Transparency – public availability of results
- Quality – quality management and data of acceptable level for verification

Penny opened the floor for questions regarding her presentation on the EPA ETV program. Gary VanStone noted that the ETV program has been honored more abroad and wondered if there is any more effort being put forth by the EPA to get states to buy in to the program, especially for small systems. Penny responded that there is a large disparity in how to reach the end users of the verifications. She wants to get the EPA people from the program offices involved, but also to do centralized outreach for the ETV. They are not sure how effective such outreach will be. The ETV booth is sent to numerous water events such as conferences. Unfortunately, the ETV staff is small. She would like to see an increased outreach to regional EPA offices so they can get the word out to the states. She thanked ASWDA for their continued involvement and support.

John Dyson noted that the monitoring and air ETV projects seem to be dominating the results so far and wondered if these other ETVs have supplemental funding for testing. Penny responded that the division of the pilot money was up to the verification entity, and most pilots matched funding to get companies involved. She predicts that if there is a benefit to the testing, the matching funding will decline. The EPA wants to continue to support testing; the decision for more money will be up to Congress. Also, not all of the ETV pilots started at the same time (i.e. Source Water and Wet Weather Flows started in 1998), so it is hard to compare the progress in these pilots.

Glen Latimer wondered what made the other ETVs more successful in their testing. The vendors for the monitoring ETV may have had more willingness due to the fact that the end customer is one entity that is buying the product as a consumer. The PDWTS ETV is different because it is more difficult to pinpoint the end customer: our end customers are the state officials and the regional offices or implementers. We need for the ETV outreach to reach the regional offices of the states.

Penny stated that at a minimum, she wants all permittees to know the following regarding the ETV program:

- ETV is a good source of quality data
- ETV is not a product approval – you as a permitter will still have to make judgment on the product

How we get this basic message across is a huge challenge that no one has entirely figured out yet. The EPA is open to ideas on the subject.

Rick Sakaji noted that new regulations issued by the EPA have a section for best available technologies. Perhaps the ETV program should be listed here as a source of information for alternative technologies. Penny thought this was a great idea.

Penny stated that she hopes to be able to recommend to continue the PDWTS ETV to Congress in her report.

John Dyson stated that the PDWTS ETV needs more funding for testing. The manufacturers that are in attendance at this meeting are the larger drinking water companies and the smaller companies can simply not afford it. This program is aimed at small systems, and these are the people who need the testing money, not the ETVs where there are large companies and large stakeholders who can afford the testing.

Penny responded that the ETV initiative was to cover all environmental fields. Most of the ETV program is not intended for small systems, but rather where there is the market for such a project. The question of cost has not been answered yet. Testing needs to be conducted across the range of technologies – testing of unique products is needed and these products can't do multiple testing at one site. However, the ETV does not have a big budget. If the EPA absolutely had to support testing, it would have to focus on only a few technology areas. They are still determining the value of such testing.

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### **Current Industry Dynamics**

Greg McKelvey presented ideas regarding current industry dynamics and leverage funding. He began his presentation by noting that he has been involved with the PDWTS ETV from its inception; first as a Manufacturer's representative and then as a consultant to NSF doing outreach and "matchmaking" of manufacturers, FTOs and sites.

One of the drivers for Manufacturers to participate in the PDWTS ETV is the possibility of acceptance and permitting of a technology (especially a newer technology) state to state. Greg recognized that it is hard for a company to make a profit on the sale of small water treatment systems, although the potential volume of small systems sales is large. Communities and the 150,000 non-communities need disinfectants and will soon need treatment systems for arsenic, nitrate and radionuclide compliance.

Greg believes that the PDWTS ETV project can provide the following:

- A happy medium for Manufacturers – marketplace acceptance and profit
- Credible data for state administrators to review
- A way for community and non-community systems to come out on top of the regulatory confusion

This ETV project may be one of the best attempts to getting over the barriers in the water industry. For example, Calgon Carbon Corporation is getting exposure for their Sentinel Reactor and the UV industry. The parties involved in this ETV project are respected as are the protocols and test plans that have been developed.

Greg made his presentation in hopes to review the options available to Manufacturers and Field Testing Organizations (FTOs) in structuring an ETV test, outline the value added by the ETV and dispel some misconceptions about the PDWTS ETV pilot project.

Greg stated that the Manufacturers have to be involved in the overall process of the ETV to get value out of it. They have to have an idea where, when and how they want their product to be tested and they must know their potential market. Simply issuing an RFP is not of value to the Manufacturer; they must be an integral part of the process. Manufacturers should be involved in the selection of a test site, the testing costs and the number of seasons.

### **Case Example of Leverage Funding – Pittsburgh**

Greg presented an example of an ETV project that used creativity to increase value and decrease the out-of-pocket expenses to the Manufacturer. This ETV test was conducted at the Pittsburgh Water and Sewer Authority. The city of Pittsburgh had seven open-air reservoirs and wrestled with the idea of covering the reservoirs after the Surface Water Treatment Rule of 1984, which stated that open-air reservoirs must be covered, post-treated or eliminated altogether. For the seven reservoirs they had, the city built two water tanks and five floating covers, but one reservoir, Highland Park Reservoir #1, remained an issue.

Highland Park Reservoir #1 is in a scenic area of Pittsburgh with an organized community that liked the reservoir and did not want a tank or cover. A series of 12 meetings were held to discuss the issue of the reservoir and the idea came up to post-treat the water from the reservoir with membranes.

In the summer of 1998, discussions regarding the ETV began. There were six membrane pilots to be tested at the site and Gannett-Fleming, one of the NSF-approved FTOs, began discussions with the city and the manufacturers of the membrane plants regarding the ETV project opportunity. The city was concerned about delays in their piloting but talked continued. Dr. Stanley States of the Pittsburgh Water and Sewer Authority was certified to do *Giardia* and *Cryptosporidium* work and was comfortable with the ETV Protocol and Membrane Test Plan. He indicated that he would be willing to assist on the ETV project as well as the piloting for the city of Pittsburgh.

In fall of 1998, six manufacturers took their places in the field at the site: four were outside in trailers and two were inside the station's pump house. Gannett-Fleming developed quotes for performing ETV testing for scenarios where one manufacturer participated, two participated or three or more. It ended up that four manufacturers participated and therefore they were able to take advantage of Gannett-Fleming's economy of scale rate. The four manufacturers (Aquasource, Leopold/PCI, ZENON, and Pall Corporation) realized that their systems were already there and they had already made an investment at the site. The test included seeding of formalin-fixed *Giardia* and *Cryptosporidium* and on-site inspections by NSF. The ETV reports being developed are independent of each other; they are not comparative.

The average cost for a one-season ETV test of a membrane system, including seeding, was \$38,000. Of that, city in-kind contributions totaled \$3,300, vendor funding (not including the pilot system or labor) was \$8,700 and ETV matching funding was \$26,000 per test. If one manufacturer had opted to test their membrane system alone, the cost would have likely been in the range of \$60,000 or more. For this price, each manufacturer receives an ETV report and



verification statement; objective, third-party verified data; and the exposure of having a report on their product mailed to approximately 140 state drinking water administrators.

Greg stated that opportunities exist for most manufacturers similar to this situation where they are already piloting a system. We need to start thinking of win-win situations like this and manufacturers need to seek out these situations for themselves rather than throwing out a blind request for proposal.

### **Ideas for Private Sources of Funding**

Bruce Bartley presented some ideas for private sources of funding that NSF has been looking into since the last Steering Committee meeting.

There are four federally mandated technical assistance centers that receive \$500,000 per year. They work with technologies that are transferable to small systems. The centers include:

- Western Kentucky University, which has good laboratory experience but lacks field experience.
- University of New Hampshire, which is an NSF-approved FTO for the PDWTS ETV
- University of Missouri at Columbia, which has microbiological expertise
- Montana State University, which operates as a clearinghouse and accept requests for testing

There are five other assistance centers, including the University of Alaska at Anchorage, who has contacted NSF regarding the ETV project. They have one manufacturer ready to participate in a study on treatment of DBPs at schools in remote locations. They may need to partner with an approved FTO to fulfill all the qualifications to act as a PDWTS ETV FTO.

Another possible source of funding is medium and large utilities, especially for technologies that are transferable in terms of size. Research Foundations such as AWWARF, EPRI, NWRI and RWERF are possible sources for these transferable types of technologies.

Lending Institutions such as investment banks and rural utilities services are another possibility for funding.

Small communities have special challenges, needs and opportunities. Small communities often have limited funding; however there are technologies that are unique to small communities such as bag and cartridge filters, and on-site disinfection techniques.

Jerry Biberstine touched on the use of the protocols and test plans by state administrators. Some states are beginning to use the ETV protocols for their pilot testing. Like Standards 60 and 61, the states are finding it difficult to require ETV testing right off the bat, but now that the protocols are out there, the states may not opt to create their own going forward. Jerry suggested that if a manufacturer planned to pilot a system, that they get more manufacturers involved to verify the technologies and lower the cost to them.

Kevin Brown had a few more ideas for other sources of funding the verification testing. He thought that specific industries such as the mining industry may be able to make contributions to

testing products that would be applicable to them. The Department of Agriculture may be interested in testing systems in rural communities where nitrate and pesticides are a problem. Also, some states have state revolving loan funds. For example, Utah may provide a grant for ETV testing as long as it would benefit the site or installation where the testing occurred. Bruce replied that he thought the state revolving funds would not cover testing and Kevin stated that the policy varies from state to state. Peter Shanaghan added that some states set aside money that can be used for testing.

Kent Kise of Perrier stated that they are part of Nestle, which has a \$4 billion bottled water market that must meet the EPA requirements and the requirements of all states. They are looking for a common denominator among states. They have the financing to support testing and piloting activities and look at all technology types as an end user. He recommends that this ETV pilot get all potential end-users involved in this stakeholder process.

Glen Latimer responded to comments made by Jerry Biberstine regarding state use of the ETV protocols and test plans. Kinetico saw the potential of the ETV testing to some day be required and that is one reason they participated in the ETV project. Now if the states have these protocols, and the government pulls out of the project, the states may continue to use the protocols but the funding will not be there and the cost of the systems may be driven up by having to test against these thorough protocols. Jerry recognized that is a possibility and added that is why we need to find other sources of funding to make the testing as unburdensome as possible.

John Dyson stated that he believes the states will not require the ETV protocols and test plans because it will put limits on the possibilities of equipment – small companies will be eliminated because they will not be able to afford testing. In addition, there is a limit on what ETV testing can predict as far as product performance. Although groundwaters are fairly consistent, surface water quality fluctuates.

Jim Bell noted that the ETV was initiated to allow new technologies to be introduced into the marketplace. The current presentation for ETV testing to reduce cost is multiple testing at a site, but if a company has a new technology, there is no group to unite with for testing. Also, the idea of having an investment banker fund testing is not attractive to a vendor because the entrepreneur will have to give up a large portion of his potential profits to get his idea out in the marketplace.

Jerry Biberstine consented that there are simply not enough federal dollars for testing of these systems. Newer technologies will be high on the list for technical assistance centers, but as always, it is up to the inventor to find funding for testing to prove his concept. State administrators look for new technologies but need testing data to review.

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### **Protocol Validation Studies**

Bruce Bartley discussed the validation of the ETV protocols and test plans. NSF proposes to validate protocols in which future rules may be completed after the pilot period. Protocols of

concern to the EPA and NSF include:

- On-site microbiological inactivation or disinfection
- Disinfection By-Products and their Precursors
- Arsenic
- Nitrate

NSF plans to conduct the protocol validation testing in a similar manner as done for the present market-demand verification testing except NSF and the EPA want to attain these three goals:

1. Validating protocols and test plans,
2. Demonstrating innovative and creative partnerships or relationships to achieve leveraged and/or private sector funding for testing and reporting,
3. Verifying technologies useful in meeting future drinking water regulations.

The present process will be modified slightly:

1. NSF requested notification of technologies from vendors rather than wait for the market to apply for verification. NSF requested specific technologies based on test plans that are already developed that will likely include the technologies for the treatment of disinfection by-products and their precursors, arsenic, nitrate and for on-site disinfection. NSF mailed this request for technologies to 650 persons on the pilot's mailing list, which includes vendors. Responses to this request will be made available to the organizations interested in proposing to conduct protocol validation studies.
2. NSF contacted water utilities and state regulatory agencies on its mailing list and requested test sites from them. Responses to this request will be made available to the organizations interested in proposing to conduct protocol validation studies.
3. NSF requested proposals from organizations, including the NSF-qualified FTOs, to verify equipment at the sites identified from NSF's request for sites or at a site they may have identified.
4. NSF will select an organization to conduct the testing based on the selection criteria, which is described later.

The process for verification where an FOD is prepared, and testing and reporting are conducted with the NSF's quality assurance oversight, will remain the same. However, the cost sharing by the vendor will be modified, as one of the three goals is to verify products in creative and innovative fashion. The final matching fund formula will be part of the proposals submitted to NSF.

The request for proposal that was sent to all stakeholders on August 19, 1999 outlined the selection criteria by which NSF and the EPA will select ETV tests to fund. Bruce reviewed these proposal selection criteria. They are the following:

- (a) Field Testing Organization Qualification (mandatory) - The team must meet the criteria to become a qualified Field Testing Organization (FTO) at the time they submit their proposal. This is critical to maintain quality in the ETV pilot. However, organizations that are already qualified must not re-submit qualification materials. *If the team does not meet this criteria, the proposal will be considered*

*unacceptable.*

- (b) Private Sector Funding and ETV Matching Fund Limit (mandatory) - Proposals must include an estimate of the total cost for testing and the sources to recover testing costs (e.g., ETV, vendor, water utility etc.). Proposals shall describe creative partnerships or relationships to demonstrate private sector funding. This can be done with in-kind services from any source except labor and equipment from the vendor. Other sources of funding can pay for costs (labor and expenses). Important that the team identify and show proof of the above relationships and partnerships. The ETV project will contribute no more than 75% of total testing costs, and no more than \$100,000 for one protocol validation study. Proposals that request the least amount of funding per product from the ETV and that maximize the number of products tested per protocol will rank highest. *If the team's proposal does not meet the above criteria, the proposal will be considered unacceptable.*
- (c) Schedule - The team has to have a reasonable and achievable schedule. Proposals with earliest delivery schedules will be ranked higher than those with later schedules. However, unrealistic schedules will be ranked very low. Proposals with a schedule involving multiple vendor product testing, multiple test plans or multiple sites will rank as high as a proposal with a single product testing if the schedule shows submittal of the draft report to NSF by the May 31, 2000 deadline. *Any schedule where the draft report to NSF is delivered after May 31, 2000 is considered unacceptable.*
- (d) Proven Track Record for Timeliness and Quality - The team shall demonstrate it has past experience of delivering quality work products done on time; examples include ETV, EPRI and AWWRF projects. The team must submit the names and telephone numbers of their references as part of their proposal (references can include NSF). Teams chronically late and those with poor work quality will rank lower than other teams. The team shall also demonstrate they have the ability and capacity to do the protocol validation study along with their other assignments and workload. Resumes of key personnel at both senior and junior levels shall be submitted. The resumes shall include relevant drinking water experience and other work commitments. Proposals shall describe the management structure and a description of roles and responsibilities of key personnel involved in the proposed validation study. Finally, proposals shall demonstrate that the team has an internal quality management plan or procedure in place that includes the laboratory or other component of the team. A copy of the procedure should be submitted to NSF. *Any proposal submitted without addressing the above criteria will be considered unacceptable.*
- (e) Multiple Vendors and Test Plans - Proposals involving more than one vendor will be ranked higher than proposals involving a sole vendor. Proposals for validating a protocol that involve multiple test plans (hence multiple technologies) will be ranked higher than proposals involving one test plan.

Proposals to perform protocol validation are due to NSF by September 20, 1999.

David Pearson asked if a testing organization would have to apply to qualify as an FTO to conduct the protocol validation. Bruce Bartley responded no, they would just need to meet the criteria.

John Dyson reiterated that he supports the project, but the EPA needs to keep funding the testing until Manufacturers know that they will get a return on the investment they make in testing their product. He suggested surveying manufacturers that have shown interest and asking them how much they would be willing to pay for verification testing.

### **Technical Issues**

In an effort to maintain the current protocols, NSF brought issues to the Steering Committee that were raised by stakeholders on the protocols and test plans.

#### *1. UV Dose Measurements in the UV Test Plan*

Currently, the Test Plan does not present a method of determining UV Dose other than to calculate it based on the UV Irradiance measured during verification testing. It is proposed to add another method such as a bioassay.

Rick Sakaji stated that for water recycling, the dose delivered to the system must be known to assure the system is performing how it should. With chlorine, residual can be measured for assurance, but with UV, there is no such measure of assurance that a certain dose is being delivered.

Gary VanStone stated that he is working with a technical work group on the issue of measuring dose and ensuring that a reactor delivers a certain dose. Procedures that are available from Europe are suppose to be reviewed by this group.

Rick Sakaji said that a system recently installed in California is not working in the field properly; the calculated dose is not having the same effect as was predicting by a seeding study. Rick suggested that perhaps a pilot scale collimated beam study test and a bioassay could be used to determine dose response curves to reference for continuous flow reactors. A correction factor could be applied if the curves do not line up.

Yuri Lawryshyn added that a bioassay protocol is needed to calibrate or determine dose. A bioassay test can ensure that short-circuiting is not occurring, then a collimated beam study is done with a low pressure lamp (254 nm) with the same water. The calculations used in Norway use average irradiance and average time, but it assume perfect mixing, which does not occur. The manufacturers are starting to design their systems to fit this calculation. Rick Sakaji agreed that reactors can be designed to work in certain flow regimes. Yuri suggested that the ETV test plan require reactor dose to be determined at a certain flow rate and transmittance and then O&M issues can be tested afterward in the field. The verification report should also outline factors that affect fouling of the system.

Jerry Biberstine suggested that Yuri, Rick and Gary VanStone or others that are interested

propose a way of modifying the test plan to capture this idea. A general consensus was reached to proceed in this manner.

Gary VanStone added that he can submit to the ETV pilot any conclusions reached by the technical work group in which he is participating. Bruce Bartley added that this issue should be resolved before any protocol validation studies occur on the UV Test Plan. Therefore, proposals submitted for UV testing will be held until this issue is resolved.

Yuri added that a dose response curve needs to be developed for each organism of concern. Bruce stated that is outside the scope of the ETV pilot, but AWWARF is working on such curves. Also, ANSI/NSF Standard 55 has been developed for collimated beam, studies and that this method could be referenced in the ETV protocol and test plan.

## *2. Algal Growth in Sample Tube Lines – All Applicable Test Plans*

For technologies that use tubing as part of the package plant or as part of the sampling set-up, it is a concern that algal growth in the tubing will affect sample results. Bruce Bartley suggested that opaque tubing such as PVC, teflon, or stainless steel tubing be used instead of tygon tubing, which has exhibited this problem. This is of particular concern in the Advanced Oxidation Test Plans.

## *3. In-Line Seeding for Test Plan for Microbiological Reduction by Membranes*

Currently, the optional task for microbiological seeding specifies that the microorganisms shall be seeded into a feed water tank from which the seeding of the feed water will occur. It was proposed to change this requirement to allow in-line injection of microorganisms rather than require batch seeding.

Anne Braghetta stated that static mixing and seed concentration are concerns for in-line injection of seed. Rick Sakaji also inquired about the propagation of organisms. Does a standard need to be developed for that? If clumping of the particles or organisms is occurring, a false high removal could be exhibited by membranes.

Bruce Bartley stated that we would need more information in support of these ideas before anything could be incorporated into the test plans.

## *4. Requiring Testing for Variability of Bag and Cartridge Filters in the Test Plan*

Currently, there is an optional initial operations task which involves setting up and operating the filter bags or cartridges to assess the variability of the filter within one manufacturing lot and among three different manufacturing lots. It was proposed to change the Test Plan to make this a mandatory task for all verification testing involving filter bags or cartridges.

The discussion favored requiring the variability testing to ensure consistent quality. Jerry proposed making the change to the test plan. All in favor; none opposed. The Steering Committee recommended making the change to the test plan accordingly.

Dan Mosley was concerned about the extra cost of doing this variability testing; the manufacturers are concerned about the cost of this testing getting out of hand. Jerry Biberstine asked if there is any other way he would suggest. Dan suggested two ideas:

- Replying on ISO 9001 certification documentation
- Test three filters from the same lot and three from different lots concurrently to reduce time and reduce the number of filters used from six to five

The stakeholders liked the idea of testing concurrently and it was agreed to give this option in the test plan. The Steering Committee recommended making the change to the test plan accordingly.

#### *5. Laboratory Testing of Microbiological Removal in the Precoat Filtration Test Plan*

Currently, it is required that the task to demonstrate microbiological removal capabilities be performed at a field site. It was proposed by an FTO to change the Test Plan to allow this task to occur in a laboratory with tap water or deionized water so that it would be covered under the funding umbrella of ETV.

Jerry Biberstine stated that he is not in favor of this idea because the ETV tests are designed to be real-life, in-field tests. Kristie Wilhelm explained that the FTO's argument is that the laboratory testing would actually be more challenging than field testing. Gary VanStone agreed with Jerry that site conditions such as particulates in the feed water should be used to determine how it works.

Jim Bell recommended having the FTO write a formal proposal to be considered by the technical subcommittee of the Steering Committee. All agreed.

#### *6. Use of Microspheres in Membrane Test Plan for Microbiological Reduction*

Currently, it is required that the optional microbiological removal task be performed with protozoa and/or MS2 virus (viable or formalin-fixed). It is proposed to change the Test Plan to allow for the seeding of microspheres as a surrogate.

Anne Braghetta stated that she has seen studies where removal of microspheres was greater than (overpredicted) removal of *Giardia* and *Cryptosporidium*. She added that heat inactivated cysts are a good alternative. Rick Sakaji agreed with these statements. Anne thought that all test plans for microbiological reduction technologies should have the same options for the microbiological removal task. Currently, some test plans allow for microsphere challenges and some do not.

Jeff Adams suggested that Anne submit the study that she reference for the Steering Committee to review.

#### *7. Recommendation for Standard 61*

The Steering Committee had been issued a statement that NSF proposed to add to each test plan recommending that resins or membranes or any other material or chemical in the package plant conform to Standard 61. Jim Bell stated that Standard 60 should be added to this recommendation since some package plants actually add chemicals to the water. The Steering Committee was in agreement: 12 in favor, none opposed.

**Information Dissemination**

All attendees of the meeting will receive this meeting summary and it will be posted on the internet. All major announcements for the project will be sent to everyone on the mailing list, which now consists of over 600 people.

The meeting was adjourned at 3:00 p.m.

\*\*\*If you would like to receive a hard copy of the overheads presented at the meeting and a list of attendees with addresses, phone numbers and e-mail addresses, please contact Carol Becker at (734) 769-5394 or [becker@nsf.org](mailto:becker@nsf.org)\*\*\*



List of attendees at the August 24, 1999 Steering Committee Meeting:

Jeff Adams, US EPA  
Bruce Bartley, NSF International  
Carol Becker, NSF International  
Jim Bell, Smith & Loveless  
Allison Benjamin, ICF Consulting  
Ramesh Bhawe, US Filter/Memcor  
Jerry Biberstine, Colorado DPH&E  
Anne Braghetta, Montgomery Watson  
Jeremy Brown, NSF International  
Kevin Brown, Utah DEQ  
Tom Bruursema, NSF International  
Bob Carter, Ecolab  
M. Robin Collins, University of New Hampshire  
John Dyson, WWEMA/IDI  
Bryce Feigner, Michigan DEQ  
Allen Hammer, VA Department of Health  
Penny Hansen, US EPA  
Joe Harrison, WQA  
Kent Kise, Perrier Group of America  
Glen Latimer, Kinetico  
Yuri Lawryshyn, Trojan Technologies  
Gary Logsdon, Black & Veatch  
Greg McKelvey, McKelvey Environmental Management  
Dale Mork, Osmonics  
Dan Mosley, U.F. Strainrite  
Bridget O'Grady, ASDWA  
David Pearson, PCI Membrane Systems  
Peter Cartwright, Cartwright, Olsen & Associates  
Rick Sakaji, CA DHS  
Peter Shanaghan, US EPA  
Bak Srikanth, Aquafine Corp.  
Tom Steinke, US Filter  
Dan Uhr, Pall Corp.  
Gary VanStone, Calgon Carbon Corp  
Tony Wachinski, Pall Corp  
Lee Wikstrom, Arch Chemicals  
Victor Wilford, WV Bureau for Public Health  
Kristie Wilhelm, NSF International